May 28, 1998

Mr. John Sampson
Site Vice President
Nuclear Generation Group
American Electric Power Company
500 Circle Drive
Buchanan, MI 49107-1395

SUBJECT: D. C. COOK INSPECTION REPORT 50-315/98008(DRP); 50-316/98008(DRP) AND NOTICE OF VIOLATION

Dear Mr. Sampson:

On April 27, 1998, the NRC completed an inspection at your D. C. Cook Units 1 and 2 reactor facilities. The enclosed report presents the results of that inspection. During the 6-week period covered by this inspection report, the inspectors observed that the plant was maintained shutdown in a safe manner and that shutdown activities were focused on safety.

Based on the results of this inspection, three violations of NRC requirements were identified by the NRC. The violations are cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding them are described in detail in the subject inspection report. The first violation involved a failure to follow procedure by contract maintenance workers. The violation is of concern because of the failure of the contract workers to verify the proper bolting configuration on the 1 CD emergency diesel generator. The improper bolting configuration could have led to a failure on that engine similar to the exhaust manifold bracket failure which caused the 2 AB emergency diesel generator to become inoperable. The second violation involved the inadequate root cause determination by your staff regarding the missing jam nuts. Your staff's assessment determined that the root cause could not be identified, while the NRC inspectors determined the root cause was due to poor contractor performance. The third violation involved the failure of the Unit 2 operators to use a procedure designated as "Continuous Use" at the job site. The Unit 2 operators were not sure which general plant procedures, if any, were in use while operating in Mode 5, and this resulted in the operators failing to continuously use the procedure as required.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, the enclosures, and your response will be placed in the NRC Public Document Room.

Sincerely,

/s/ J. A. Grobe

John A. Grobe, Director
Division of Reactor Safety

Docket Nos.: 50-315; 50-316
License Nos.: DPR-58; DPR-74

Enclosures:
1. Notice of Violation
2. Inspection Report 50-315/98008(DRP); 50-316/98008(DRP)

cc w/encls:
Don Hafer, Acting Chief
Nuclear Engineer
Douglas Cooper, Plant Manager
Richard Whale, Michigan Public
Service Commission
Michigan Department of
Environmental Quality
Emergency Management
Division, MI Department
of State Police
David A. Lochbaum, Union
of Concerned Scientists

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NOTICE OF VIOLATION

Indiana Michigan Power Company Docket Nos.: 50-315; 50-316
Donald C. Cook Nuclear Power Plant License Nos.: DPR-58; DPR-74

During an NRC inspection conducted from March 13 to April 27, 1998, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

1. Technical Specification 6.8.1 requires, in part, that written procedures shall be established, implemented and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide (RG) 1.33, Revision 2, February 1978.

   Regulatory Guide 1.33, “Quality Assurance Program Requirements (Operation),” Revision 2, February 1978, Appendix A, recommended, in part, that maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Job Order C18424 was written in accordance with RG 1.33 to provide instructions for installing minor modification (MM)-438 on the 1 CD emergency diesel generator.

   Contrary to the above, on April 24, 1998, the inspectors determined that in March 1997, contract workers failed to properly implement a maintenance procedure for safety- related equipment in that they installed MM-438 on the 1 CD emergency diesel generator and improperly reinstalled the exhaust manifold bracket without the jam nuts as required by Job Order C18424.

   This is a Severity Level IV violation (Supplement I).

2. 10 CFR Part 50, Appendix B, Criterion XVI, requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected, and that in the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management.

   Contrary to the above, on April 24, 1998, the inspectors identified that the licensee’s final investigation report of the missing jam nuts on the 1 CD emergency diesel generator, a significant condition adverse to quality, did not document the cause of the missing jam nuts.

   This is a Severity Level IV violation (Supplement I).

3. Technical Specification 6.8.1 requires, in part, that written procedures shall be established, implemented and maintained covering the applicable procedures recommended in Appendix A of RG 1.33, Revision 2, February 1978.

Regulatory Guide 1.33, “Quality Assurance Program Requirements (Operation),” Revision 2, February 1978, Appendix A, recommended, in part, that administrative procedures covering procedure adherence be written. Plant Manager’s Instruction (PMI) 2011, Revision 4, “Procedure Use and Adherence,” was written in accordance with RG 1.33. Step 4.1.3 of PMI - 2011, required that for procedures designated as “Continuous Use,” the procedure shall be in use at the job site.

Contrary to the above, on April 26, 1998, the inspectors determined that the Unit 2 Operations Head Procedure 4021.001.001, Revision 20, “Plant Heatup From Cold Shutdown to Hot Standby,” designated as “Continuous Use,” was being used to maintain the plant in Cold Shutdown, but the procedure was not in use at the job site as required by PMI - 2011, Revision 4, “Procedure Use and Adherence,” Step 4.1.3.

This is a Severity Level IV violation (Supplement I).

Pursuant to the provisions of 10 CFR 2.201, Indiana Michigan Power Company is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region III, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Dated at Lisle, Illinois
this 28th day of May 1998

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-315; 50-316
License Nos:	DPR-58; DPR-74
Report No:	50-315/98008(DRP); 50-316/98008(DRP)
Licensee:	Indiana and Michigan Power 500 Circle Drive Buchanan, MI 49107-1395
Facility:	Donald C. Cook Nuclear Generating Plant
Location:	1 Cook Place Bridgman, MI 49106
Dates:	March 13 through April 27, 1998
Inspectors:	B. L. Bartlett, Senior Resident Inspector J. D. Maynen, Resident Inspector
Approved by:	Bruce L. Burgess, Chief Reactor Projects Branch 6

EXECUTIVE SUMMARY

D. C. Cook Units 1 and 2
NRC Inspection Report No. 50-315/98008(DRP); 50-316/98008(DRP)

This inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a 6-week period of resident inspection and includes follow up on issues identified during previous inspection reports.

Operations

- The inspectors determined that the continuous use procedure covering plant heatup for Unit 2 was not known by the operators to be in effect, was not readily available, and was not in use. A violation for failure to follow procedure was identified (Section O1.2).

- The licensee's procedure providing guidance for ventilation equipment required to support Technical Specification (TS) equipment was weak. The procedure addressed a complete failure of the ventilation equipment but failed to address degraded performance issues. A review of licensee documentation failed to identify any examples of inoperable TS equipment as a result of the weak procedure (Section O1.3).

- The licensee's investigation report into the exhaust manifold bracket failure on the 2 AB emergency diesel generator (2 AB D/G) did not document the root cause for the missing jam nuts on the 1 CD and 2 AB D/Gs. The inspectors concluded that appropriate corrective actions for this significant condition adverse to quality could not be implemented without an adequate root cause determination. A violation of 10 CFR Part 50, Appendix B, Criterion XVI, was identified (Section O7.1).

Maintenance

- The inspectors determined that during the installation of a minor modification (MM) in March 1997, the contract workers installing MM-438 on the 1 CD emergency diesel generator loosened and improperly reinstalled the exhaust manifold bracket bolting without the jam nuts as required by the job order. This improper bolting configuration could have led to a failure on that engine similar to the exhaust manifold bracket failure which caused the 2 AB D/G to become inoperable for repairs. The failure to install jam nuts in accordance with the job order was a violation of TS 6.8.1 (Section M2.1).

Engineering

- For those items sampled, the inspectors determined that the System Engineering Review Board (SERB) and Restart Oversight Committee (ROC) appropriately determined whether the item was required to be corrected prior to restart of the units. However, the ROC appeared to perform only a minimal review and assessment on those items the SERB did not recommend be corrected prior to restart (Section E7.1).

Plant Support

- The inspectors identified a non-safety-related High Efficiency Particulate Absorber filter installed in an unapproved manner in the steam generator storage building. Licensee personnel failed to identify the improper installation even though multiple entries had been made by radiation protection personnel to perform routine surveys (Section R1).

Report Details

Summary of Plant Status

Unit 1 remained in Mode 5, Cold Shutdown, during this inspection period. The unplanned outage was in response to NRC and licensee concerns with the operability of the containment recirculation sump and other engineering issues.

Unit 2 remained in Mode 5, Cold Shutdown, during this inspection period. The unplanned outage was in response to NRC and licensee concerns with the operability of the containment recirculation sump and other engineering issues.

I. Operations

O1 Conduct of Operations

O1.2 Control Room Procedure Use (Both Units)

a. Inspection Scope (71707)

The inspectors determined that the licensee had no operating procedure covering their current Mode of operation (Mode 5 - Cold Shutdown). The inspectors evaluated the plant configuration and compared the configuration to the plant operating procedures. Documentation reviewed included:

- Operations Head Instruction (OHI) - 2000, Revision 2, Operations Department Guidance Policy
- OHI - 2010, Revision 7, Operations Department Procedure Maintenance
- 02-Operations Head Procedure 4021.001.001, Revision 20, Plant Heatup From Cold Shutdown To Hot Standby
- 02-Operations Head Procedure 4021.001.004, Revision 20, Plant Cooldown From Hot Standby to Cold Shutdown
- Plant Managers Instruction (PMI) - 2011, Revision 4, Procedure Use and Adherence
- Quality Assurance Program Description, Dated August 15, 1995

b. Observations and Findings

During a routine control room observation on April 26, 1998, the inspectors determined that Unit 1 was being maintained in Mode 5 without utilization of a general operating procedure. Unit 2 was being maintained in Mode 5 through the use of the plant heatup procedure (OHP 4021.001.001). When questioned, the operators on Unit 2 did not know which procedure they were in, but initially the operators thought that they were in the plant cooldown procedure (OHP 4021.001.003). Following additional questioning from the inspectors, the

Unit 2 operators decided that they were in the plant heatup procedure (OHP 4021.001.001). The inspectors pointed out that the heatup procedure was required to be used continuously when it was being performed, but the procedure was not out and in use.

The Unit 2 operators then decided they were not in OHP 4021.001.001; the operators were just in the normal operating procedure for the residual heat removal system. However, for the performance of the Low Temperature Overpressure Protection (LTOP) Technical Specification (TS) surveillances, the operators were recording the required data using the attachments to the heatup procedure.

The next morning, the Assistant Shift Supervisor found the Unit 2 Procedure OHP 4021.001.001 on a back desk in the control room. The procedure had not been closed out, had not been revision checked in over 3 months, and the night shift operating crew had not known that it was still in use. The failure to use the appropriate procedure has, in the past, resulted in failures to comply with TS.

Technical Specification 6.8.1 requires, in part, that written procedures shall be established, implemented and maintained covering the applicable procedures recommended in Appendix "A" of Regulatory Guide 1.22, Revision 2, February 1978. Regulatory Guide (RG) 1.33, Quality Assurance Program Requirements (Operation), Revision 2, February 1978, Appendix A, recommended, in part, that procedures be written and implemented governing the use of safety-related procedures. Plant Managers's Instruction 2011 was written in accordance with RG 1.33 to provide instructions on the use of plant procedures. PMI-2011, Revision 4, required, in part, that procedures designated as "Continuous Use," shall be in use at the job site. Procedure 02-OHP 4021.001.001, Revision 20, was designated "Continuous Use," but it was not known by the Unit 2 operators to be in effect, and it was not in use. The failure to follow PMI-2011 regarding the use of "Continuous Use" procedures was a violation (50-316/98008-03(DRP)) of TS 6.8.1.

c. Conclusions

The inspectors determined that the continuous use procedure covering plant heatup for Unit 2 was not known by the operators to be in effect, was not readily available, and was not in use. A violation for failure to follow procedure was identified.

O1.3 Ventilation Impact on Technical Specification Equipment (Both Units)

a. Inspection Scope (71707)

During an assessment of the operability status of the Unit 2 CD emergency diesel generator (2 CD D/G), the inspectors questioned ventilation effects on D/G operability. The inspectors reviewed the documentation listed below and interviewed licensee personnel in an effort to ensure the licensee had declared the appropriate equipment inoperable/operable as required by TS.

- 12 - Plant Managers Procedure (PMP) 4030.001.001, Revision 0, Impact of Safety Related Ventilation on the Operability of TS Equipment

- Condition Report (CR) 98-1323, The preventive maintenance to clean and inspect the 2 CD D/G room exhaust fan exceeded its drop dead date

- Reoccurring Job Order R0017464, 2-year preventive maintenance to calibrate the Unit 2 CD D/G overspeed indication and trip circuit

- R0034692, 2-year preventive maintenance to calibrate the Unit 2 CD D/G overspeed indication and trip circuit

b. Observations and Findings

Procedure 12 PMP 4030.001.001, Attachment 3, stated, that if a D/G room exhaust fan was incapable of moving air, the operators had a choice of either implementing the listed compensatory measures or declaring the associated D/G inoperable. The procedure defined the phrase, "incapable of moving air," as, "... the system has failed and requires repair. Examples of this include: Collapsed ductwork which limits or prevents flow the system...."

As noted in Inspection Report 50-315/92009, the reduction of air flow into and/or out of a D/G room can affect the operability of the D/G. An exhaust fan that was degraded but still moving air would meet literal compliance with Procedure PMP 4030.001.001, yet might not meet design basis flow rates. Under those conditions, the operability of the associated D/G would be in question.

Other safety-related components addressed by Procedure PMP 4030.001.001, included the essential service water (ESW) pumps, turbine driven auxiliary feedwater pumps (TDAFWP), motor driven auxiliary feedwater pumps (MDAFWP), component cooling water pumps (CCW), 4 kV switchgear rooms, 600 V transformer rooms, and control room instrument distribution (CRID) inverter rooms. The ventilation requirements for these rooms also included the phrase "incapable of moving air," yet, similar to the D/G rooms, degraded ventilation flow could impact the operability of the affected safety-related equipment. The inspectors reviewed ventilation documentation for these systems but found no instances of inoperable TS equipment.

The inspectors interviewed licensee personnel and determined that the procedure was usually implemented during routine maintenance activities when it was obvious the fans were not capable of moving air. Since the procedure was first written, there have been several instances where fans were found inoperable, and the appropriate compensatory measures were established.

c. Conclusions

The licensee's procedure providing guidance for ventilation equipment required to support TS equipment was weak. The procedure addressed a complete failure of the ventilation equipment but failed to address degraded performance issues. A review of licensee documentation failed to identify any examples of inoperable TS equipment as a result of the weak procedure.

O7 Quality Assurance in Operations

O7.1 Investigation into the Unit 2 AB Emergency Diesel Generator Bracket Failure (71707)

a. Inspection Scope

On October 19, 1997, while running the 2 AB emergency diesel generator (2AB D/G) for an 8-hour surveillance test, the flywheel end exhaust manifold bracket (bracket) failed. The licensee investigated the event, and on December 30, 1997, the approved final investigation report was issued. The inspectors reviewed the licensee's investigation report into the bracket failure. Specific details concerning the bracket failure are discussed below in Section M2.1.

b. Observations and Findings

The licensee's investigation report stated that the probable cause of the 2 AB D/G bracket failure was the loosening of the upper bracket bolt. An examination of the as-found damage determined that the bolt did not have a jam nut installed as required by the installation drawing. The licensee inspected the other three D/Gs and found that the 1 CD D/G bracket was also missing jam nuts. The licensee's investigators also determined that the as-found bracket bolt torque values on the D/Gs were acceptable on all but the 2 AB D/G; thus, no past operability concerns were evident.

The licensee's investigators following up on the 2 AB D/G bracket failure did not reach a conclusion about the root cause for the missing jam nuts on the 1 CD or 2 AB D/Gs. However, by interviewing licensee staff members identified in the investigation report, the inspectors determined that the upper bolt connection on the 1 CD D/G bracket had been loosened and improperly reassembled at the time of the modification, after the site QC inspector verified proper assembly. Based on this information, the inspectors concluded that the failure to install jam nuts on the bolted connection was another example of the contractor control problems which have been previously identified (Non-Cited Violation 50-316/97024-05). Although the 1 CD D/G bracket did not fail, missing jam nuts were identified as the cause for the loose bolt on the similar 2 AB D/G bracket, leading to its subsequent failure; therefore, the missing jam nuts created a significant condition adverse to quality. The cause of the missing jam nuts on the 2 AB D/G was indeterminate; however, it appeared possible that similar events had taken place on both D/Gs.

10 CFR Part 50, Appendix B, Criterion XVI, requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected, and that in the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management. The inspectors considered that the failure to determine an adequate root cause for the missing 1 CD D/G jam nuts was a violation of 10 CFR Part 50, Appendix B, Criterion XVI (50-315/98008-02 (DRP)).

c. Conclusions

The licensee's investigation report into the exhaust manifold bracket failure on the 2 AB emergency diesel generator (2AB D/G) did not document the root cause for the missing jam nuts on the 1CD and 2AB D/Gs. The inspectors concluded that appropriate corrective actions for this significant condition adverse to quality could not be implemented without an adequate root cause determination. A violation of 10 CFR Part 50, Appendix B, Criterion XVI, was identified.

O8 Miscellaneous Operations Issues

O8.1 (Closed) Inspection Follow-up Item 50-315/96002-06; 50-316/96002-06: Licensee needs to update Final Safety Analysis Report. In April 1996, NRC inspectors determined that the licensee had removed the recirculation sump level indicators and moved them to the adjacent lower containment sump which is connected to the recirculation sump. However, Section 6.2 of the Updated Final Safety Analysis Report (UFSAR) stated that alarms and redundant level indicators are provided in the containment recirculation sump. The inspectors reviewed the current UFSAR and found that Section 6.2 had been changed to reflect the change in location of the sump level indicators. This item is closed.

O8.2 (Closed) Inspection Follow-up Item 50-315/96004-06: The licensee had determined that the practice of having dual train Essential Service Water and Component Cooling Water outages during a full core off-load exceeded the licensing basis and that the UFSAR contained errors which needed to be corrected. Section E1.2.1D of Inspection Report 50-315/97201; 50-316/97201 documented the NRC Architect Engineer inspection team finding that a dual CCW/ESW train outage during refueling was inconsistent with the plant design basis. Licensee Event Report (LER) 50-316/97003 was issued to document this condition. This issue will be tracked under the more recent LER and Inspection Report 50-315/97201; therefore, this item is closed.

O8.3 (Open) Licensee Event Report 50-315/98016-00:

On March 23, 1998, the licensee found that non-safety-related cables were routed to safety-related devices in the emergency D/G load shed circuitry. The cabling from the load shed relays to the shunt trip coils on non-safety related 600-volt balance-of-plant (BOP) loads was identified as BOP cable rather than safety-related cable. The relays and shunt trip coils are safety related.

Due to the plant design, some 600-volt non-safety related balance-of-plant (BOP) loads are supplied by the safety related buses. On a loss of offsite power event, these BOP loads are supposed to load shed from the buses to prevent overloading the D/Gs when sequencing loads back to the safety-related buses. The licensee evaluated the cabling configuration and determined that some BOP loads may not properly load shed, resulting in potentially overloading one or more of the D/Gs. Following this determination, the licensee declared all four D/Gs inoperable and entered the TS action statements for shutdown A.C. electrical sources. Additionally, a 4-hour event notification was made to the NRC.

The inspectors reviewed the licensee's actions and noted that many significant work activities have been placed on hold because of the TS action statement requirements. Licensee management determined that developing a short-term and long-term solution to

the D/G cable issue was the highest priority item. Accordingly, the inspectors will continue to follow the issues documented in the LER.

O8.4 (Open) Licensee Event Report 50-315/98017-00: Debris recovered from ice condenser potentially represents unanalyzed condition. On March 27, 1998, the licensee reported to the NRC that debris found during a partial inspection of the Unit 1 ice condenser could potentially affect the ice condenser floor drains and containment recirculation. Due, in part, to this finding and recent NRC findings regarding the ice condenser (Inspection Report 50-315/98005; 50-316/98005), the licensee decided to thaw both units' ice condensers and perform a complete inspection of the ice baskets. The inspectors followed the licensee's plans for thawing the ice condensers.

The licensee has begun preparations for thawing the Unit 2 ice condenser. The intermediate deck doors and the lower inlet door shock absorbers were removed and stored in designated areas within the turbine building. Additionally, the licensee has obtained temporary holding tanks to store the ice condenser runoff. The licensee calculated the expected boron concentration in the ice melt and received permission from the State of Michigan to release the ice melt to the environment.

However, due, in part, to operational limitations regarding the emergency diesel generators (Section O8.3 above), a firm date for beginning the ice condenser thaw had not been established at the end of this report period. The inspectors will continue to follow the issues documented in this LER.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (62707 and 61726)

Portions of the following maintenance job orders, action requests, and surveillance activities were observed or reviewed by the inspectors:

- A0159605 Unit 1 West Motor Driven Auxiliary Feedwater Pump Ventilation Supply - fire damper failed to drop during testing
- A0159685 Wallplates on outside of Auxiliary Building East Wall 609' cranebay have come loose
- A0159698 Troubleshoot the ground on the Unit 2 CD Diesel Generator Bus
- C0044131 Calibration of the Unit 1 CD Diesel bearing temperature loops
- C0038650 1-WMO-906, replace 16" Non-Essential Service Water Valve using freeze seal

b. Observations and Findings

The inspectors observed that the workers followed their procedures and appropriately documented the required information. A0159685 was identified by radiation protection workers performing followup to an unidentified and unusual noise. Control room personnel promptly responded and ensured that any loose building panels did not threaten off-site power supplies and electrical transformers.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 (Closed) Unresolved Item 50-315/97018-06; 50-316/97018-06: Diesel generator exhaust manifold brackets (both units). On October 19, 1997, while running the 2 AB D/G for an 8-hour surveillance test, the flywheel end exhaust manifold bracket failed. An unresolved item was opened pending a review of the licensee's investigation into the root cause of the bracket failure.

a. Inspection Scope (62707)

The licensee completed the investigation into the root cause of the bracket failure. The inspectors reviewed the licensee's findings and the following documents:

- 12-MM - 438, "Replace the emergency diesel generator exhaust manifold structure supports"
- 12-DCP-861, "Enhancement of the bracket tab of flywheel end support assembly of exhaust manifold for Emergency Diesel Generators"
- **12 Construction Head Procedure (CHP) 5021.MCD.001, Revision 2, "Fabrication and Installation of Safety-related/Safety Interface Component Supports, Hangers, and Restraints"
- 12-Plant Manager's Procedure 7030.INV.001, Revision 0, "Condition Investigations and Approvals"
- Condition Report (CR) 97-2904, During the eight-hour surveillance test of the 2 AB D/G, the generator end exhaust manifold support bracket broke.
- Job Order C18424, Replace emergency diesel generator exhaust manifold supports, 1 CD D/G
- Job Order C19480, Replace emergency diesel generator exhaust manifold supports, 2 AB D/G
- Drawing 01-A-EQS-197, "Unit No. 1 AB and CD Diesel Support Arrangement"
- Drawing 01-A-EQS-198, "Unit No. 1 AB and CD Diesel Manifold - Exhaust Conversion"
- Drawing AEP-G13725-0, "Unit No. 2 AB and CD Diesel Support Arrangement"
- Drawing AEP-G13726-0, "Unit No. 2 AB and CD Diesel Manifold - Exhaust Conversion"

b. Observations and Findings

The licensee's investigation into the bracket failure identified that both the 1 CD D/G and the 2 AB D/G flywheel end exhaust manifold brackets were missing jam nuts. The investigation further concluded that the probable cause of the bracket failure on 2 AB D/G was the loosening of the upper bracket bolt. However, the licensee's investigation was inconclusive regarding the reason that the jam nuts were missing on the two diesels. The system engineer stated that no maintenance had been done on the 1 CD D/G or 2 AB D/G which would have required loosening the bracket bolts or removal of the exhaust manifold end cover (end cover). The end cover needed to be removed to allow access to the upper bolt. Thus, the system engineer concluded that the jam nuts had been missing since the time of the minor modification installation, in March 1997.

The inspectors interviewed the site quality control (QC) inspector who observed the bolt assembly on the 1 CD D/G on March 11, 1997. The site QC inspector recalled that the bracket bolts were properly torqued and the jam nuts were present; however, the end cover was not yet in place. Additionally, the site QC inspector stated that the two bracket bolts were installed with the bolt heads on opposite sides of the bracket, as shown on the design drawing. The site QC inspector also recalled that the contractor employees who were installing the minor modification were having trouble with the re-installation of the end cover.

The inspectors then interviewed the engineers who inspected the 1CD D/G after the 2 AB D/G bracket failed. The engineers stated that the 1 CD D/G bracket bolts were found with the bolt heads on the same side of the bracket and that no jam nuts were installed. Additionally, the engineers stated that the end cover was found in physical contact with the end of the upper bolt. This condition would have prevented an installed jam nut from falling off of the upper bolt even if it had come loose. Therefore, the engineers concluded that the jam nut was not installed at the time the end cover was replaced.

Based on the information presented in the interviews, the inspectors concluded that the contract workers installing MM-438 on the 1CD D/G had loosened and reinstalled the upper bolt in the opposite direction without the jam nut after the site QC inspector verified proper assembly. The upper bolt may have been reversed to allow the end cover to fit properly. While the reversal of the bolt was allowed by the installation drawing, a QC inspector would have been required for re-verification of the connection torque. The site QC inspector stated that neither he nor any other QC inspector were asked to verify the bolt connection after the initial verification. Although the missing jam nuts on the 1 CD D/G bracket connections had not yet led to a failure of the exhaust manifold bracket on the 1CD D/G, the risk of a failure similar to the failure which occurred on the 2 AB D/G was high.

The site QC inspector who verified the bolt assembly on the 2 AB D/G was no longer a licensee employee, so the inspectors were unable to verify the initial bolting configuration on the failed bracket. However, the MM-438 paperwork indicated that the 2 AB D/G bracket connection had also been properly made up and verified. The inspectors interviewed the engineer who inspected the 2 AB D/G bracket after it failed. The engineer stated that it was unlikely that a properly installed jam nut would come loose, and no loose jam nuts were found on or near the 2 AB D/G. Additionally, the as-found damage to the upper bolt indicated that the jam nut was not present; therefore, the engineer concluded that the jam nuts were not installed on the bracket prior to the failure. Although the inspectors were unable to draw a definite conclusion about when or why the jam nuts were removed from

the 2 AB D/G bracket, it was possible that, similar to the 1 CD D/G bracket, the bolted connections were loosened and incorrectly reassembled to allow the 2 AB D/G end cover to fit properly.

The inspectors walked down all four D/Gs and verified the bolting configuration with the design drawings. The inspectors also reviewed the examination results and as-left torque values documented in the licensee's investigation and identified no discrepancies.

Technical Specification 6.8.1 requires, in part, that written procedures shall be established, implemented and maintained covering the applicable procedures recommended in Appendix A of RG 1.22, Revision 2, February 1978. Regulatory Guide 1.33, Quality Assurance Program Requirements (Operation), Revision 2, February 1978, Appendix A, recommended, in part, that maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Job Order C18424 was written in accordance with RG 1.33 to provide instructions for installing 12-MM-438 on the 1 CD D/G.

Job Order C18424 required, in part, that the exhaust manifold brackets be installed in accordance with the appropriate drawings. Drawing 01-A-EQS-197 indicated that the bolted connections included jam nuts. Job Order C18424 also required, in part, that QC be contacted to verify proper connection configuration and torque. The failure to install 12-MM-438 on the 1 CD D/G in accordance with Job Order C18424 was a violation (50-315/98008-01) of TS 6.8.1.

c. Conclusions

The inspectors determined that during the installation of a minor modification in March 1997, the contract workers installing MM-438 on the 1 CD emergency diesel generator loosened and improperly reinstalled the exhaust manifold bracket bolting without the jam nuts as required by the job order. This improper bolting configuration could have led to a failure on that engine similar to the exhaust manifold bracket failure which caused the 2 AB D/G to become inoperable for repairs. The failure to install jam nuts in accordance with the job order was a violation of TS 6.8.1.

M2.2 (Closed) Inspection Followup Item (50-316/97018-05): Unit 2 AB diesel generator poor material condition. The 2AB D/G had been placed on an accelerated surveillance frequency following a second valid test failure in August 1997. Condition Report 97-2810 was issued on October 14, 1997, to document the third functional failure of the 2AB D/G over a 2-year period. The 2AB D/G was placed in Maintenance Rule [10 CFR 50.65] Category (a)(1) on December 4, 1997. The inspectors discussed the monitoring plan with the system engineer and concluded that the 2 AB D/G goals were commensurate with its safety significance and met the intent of Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." This item is closed.

M2.3 (Closed) Inspection Follow-up Item 50-315/94014-02; 50-316/94014-02: Ability to maintain negative pressure in the auxiliary building. During a tour of the auxiliary building, the inspectors found the door (1-DR-AUX-385) from the Unit 1 Quadrant 2 room to the non-essential service water (NESW) valve gallery open. The inspectors questioned whether having this door open would prevent the ventilation system from developing a negative

pressure in the Quadrant 2 room. With this door open, the Quadrant 2 room communicated directly with the area outside the auxiliary building. A similar condition existed for the Unit 2 Quadrant 2 room (2-DR-AUX-386).

The licensee assessed the original configuration and found that each unit's Quadrant 2 room, NESW valve gallery, electrical tunnel, and east main steam valve enclosure were included as part of a single radiation zone on the post accident radiation zone maps. Based on the maps and the physical configuration of the containment penetrations in these area, the licensee concluded that unmonitored radiation releases from these areas were not likely. Additionally, the licensee found that no high energy lines had postulated breaks within the Quadrant 2 rooms. Therefore, the assessment concluded that the original configuration was acceptable. The inspectors reviewed the assessment and had no questions.

However, due to the potential for recirculation water from the containment sump to flow through the boron injection tank (BIT) in some post accident scenarios, the licensee decided to include the Quadrant 2 rooms in the auxiliary building pressure boundary (ABPB). These scenarios postulated elevated activity inside the Quadrant 2 room, in the area near the BIT. Attachment 1 to Plant Manager's Procedure 4030.001.002, "Administrative Requirements for Ventilation Boundary and High Energy Line Break Barriers," was revised, adding both units' Quadrant 2 rooms to the ABPB. Doors 1-DR-AUX-385 and 2-DR-AUX-386 were closed, and the doors to the general auxiliary building were opened for ventilation reasons. The inspectors reviewed the APBP, high energy line break, and fire protection functions for both units' Quadrant 2 room doors and compared the door requirements to the updated final safety analysis report. No discrepancies were identified; therefore, this item is closed.

M4 Maintenance Staff Knowledge and Performance

M4.1 (Closed) Inspection Follow-up Item 50-315/96006-13; 50-316/96006-13: Weak work practices observed during new fuel receipt. Inspection Report 50-315/96003; 50-316/96003 documented weak work practices during new fuel receipt. In Inspection Report 50-315/97002; 50-316/97002, the NRC documented additional procedural deficiencies in the licensee's receipt of new fuel assemblies which resulted in several violations of NRC requirements. The licensee conducted an in-depth review and upgrade to the process of receiving new fuel, and on August 14, 1997, the licensee commenced fuel receipt in preparation for a Unit 2 refueling outage. Inspection Report 50-315/97015; 50-316/97015 documented this new fuel receipt inspection and closed the procedural violations. The inspectors had no new concerns; therefore, this item is closed.

M8 Miscellaneous Maintenance Issues

M8.1 (Closed) Licensee Event Report 50-315/95010-00: Inadequate Communication Results in Unexpected Engineered Safety Features Actuation. On October 20, 1995, while Unit 1 was shutdown, an unexpected reactor trip signal was generated. The trip signal was caused by instrumentation and control (I&C) personnel repairing intermediate range Neutron Flux Detector 1-NRI-36. The reactor trip breakers opened, but since the unit was shutdown no rod movement occurred. No other plant equipment was affected. This event was discussed in Inspection Report 50-315/95012; 50-316/95012. The inspectors considered the licensee's response to this event to be timely and thorough. The licensee event report documented no new issues; therefore, this licensee event report is closed.

M8.2 (Closed) Violation 50-315/96009-03; 50-316/96009-03: Inadequate Maintenance Rule Reliability Monitoring Criteria

The licensee has demonstrated through the use of a sensitivity study that the demand failure and availability assumptions in their probabilistic risk assessment were preserved. The demonstration was performed by substituting the maintenance rule functional failures divided by the estimated number of demands in place of the probabilistic risk assessment demand failure data and the maintenance rule unavailability performance criteria in place of the probabilistic risk assessment unavailability probability.

The licensee approach included several conservative assumptions which included the following:

1. The licensee's maintenance rule program considered functional failures that are not modeled in their probabilistic risk assessment. For example, a normally open motor operated valve that fails a stroke time test would be considered a maintenance rule functional failure; however, this valve would not be modeled in the probabilistic risk assessment since it is normally open.

2. The sensitivity study considered degradation of functions where the performance criteria were more conservative that the probabilistic risk assessment assumptions.

3. The sensitivity study assumed that every function degrades simultaneously. There is an extremely low probability that this would ever occur.

Using this approach, the licensee calculated a core damage frequency of 1.25E-4 which is 76 percent higher than their baseline core damage frequency of 7.09E-5. This is a relatively small increase in core damage frequency.

Given the conservatism in the sensitivity study and the relatively small increase in core damage frequency, the licensee has successfully demonstrated that their performance criteria is commensurate with safety and has preserved their probabilistic risk assessment assumptions. This violation is closed.

III. Engineering

E7 Quality Assurance in Engineering Activities

E7.1 Engineering Performance In Restart Activities (Both Units)

a. Inspection Scope (37551)

The inspectors assessed selected licensee meetings on restart activities.

b. Observations and Findings

During this inspection period significant licensee engineering resources were spent on the implementation of the restart plan and performing system walk downs. The inspectors observed selected System Engineering Review Board (SERB) and Restart Oversight Committee (ROC), which oversees the SERB. The SERB performed the initial review of the system walk down results. The ROC then performed an additional review in an oversight role. The inspectors evaluated selected walk down items. For those items sampled, the inspectors concluded that the SERB and ROC appropriately determined whether the item was required to be corrected prior to restart of the units. However, the inspectors observed that the ROC members concentrated on those items which were recommended to be corrected prior to restart by the SERB. Minimal review and assessment were performed on those items which the SERB did not recommend for restart. Some members of the ROC did question some of the items not-recommended to be corrected prior to the restart by the SERB; however, the questions were few and widely separated.

During inspector observations of selected SERB meetings, licensee personnel carefully evaluated each item against the Board's understanding of the item's effect on the system to help decide if the item required correction prior to restart. During a Senior Management Review Team (SMRT), contractor personnel presented their observations of the BERB to licensee management. The most significant comment was that the contractors observed little guidance being provided from the SERB to the engineers performing the system walk downs. Licensee management told the contractors that they were still in the process of learning how to perform the walk downs and were making improvements. In addition, licensee management stated that at the end of the system walk downs they would assess the need to re-perform the any system walk downs. The inspectors noted that, at the time of the licensee management's statement, a little over half of the system walk downs were completed.

Additional NRC assessments will be performed; however, the nature and extent of the NRC assessments will be guided by Manual Chapter 0350, Staff Guidelines for Restart Approval, D. C. Cook specific plan.

c. Conclusions

For those items sampled, the inspectors determined that the System Engineering Review Board (SERB) and Restart Oversight Committee (ROC) appropriately determined whether

the item was required to be corrected prior to restart of the units. However, the ROC appeared to perform only a minimal review and assessment on those items the SERB did not recommend for restart.

E8 Miscellaneous Engineering Issues

E8.1 (Closed) Violation 50-316/95013-02: Missed surveillance due to misapplication of Regulatory Guide. On December 29, 1995, the 2 CD D/G failed to start during a post maintenance test. The system engineer did not use RG 1.108, as specified in TS 3.8.1.1, to determine whether the 2 CD D/G start failure was valid. The subsequent erroneous decision, based on RG 1.9, that the failure was not valid resulted in a failure to test the 2 CD D/G at the increased frequency as specified in TS 3.8.1.1.

The inspectors interviewed the system engineer and reviewed the classification of start demands for all four D/Gs since December 1995. The licensee's reply to this violation stated, in part, that a TS amendment would be submitted to allow the use of RG 1.9 in place of RG 1.108 for determination of valid tests; however, the TS has not yet been amended to allow the use of RG 1.9. The inspectors determined that all subsequent D/G start demands have been appropriately classified in accordance with RG 1.108. The inspectors also found that the D/G surveillance tests have been performed at the proper frequency; therefore, this violation is closed.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls (71750)

During a routine tour of buildings outside of the protected area, the inspectors observed a non-safety-related filter installed in a questionable manner. The storage building for the used Unit 2 steam generators contained a high efficiency particulate absorber (HEPA) filter that was secured in place with duct tape and wire. The filter was on the end of a 10" diameter pipe that was designed to hold a HEPA filter; however, the filter was not installed in accordance with the drawing.

The purpose of the filter was to ensure that any air movement out of the building was uncontaminated. The jury-rigged filter would have performed the intended function; however, the improper installation made it more subject to damage. The inspectors noted that the filter had been in place since approximately 1988 with four or more inspections each year of the facility by licensee personnel, yet the improper HEPA filter installation had not been questioned.

Following identification by the inspectors, a condition report was issued and an action request was written to restore the filter to its as designed configuration.

No other discrepancies were noted.

S1 Conduct of Security and Safeguards Activities (71750)

During a routine tour of the auxiliary building the inspectors observed a security fighting position that was blocked by material stored in the area. The stored material would hinder

the view of security personnel using the position. The inspectors informed the security shift captain who began an evaluation. The inspectors were informed that the fighting position was no longer used, that security personnel had been trained to use new position, and that the security personnel procedures had been altered to reflect the new position. The licensee noted that the Security Deployment Plan had not been modified to reflect the new position. The inspectors verified that the licensee initiated a revision to the Deployment Plan and that the plan was for internal use only and was not required to meet NRC regulations.

No other discrepancies were noted.

F1 Control of Fire Protection Activities (71750)

During normal resident inspection activities, routine observations were conducted in the area of fire protection activities using Inspection Procedure 71750. No discrepancies were noted.

X1 Exit Meeting

The inspectors presented the inspection results to members of the licensee management at the conclusion of the inspection on April 27, 1998. The licensee had additional comments on some of the findings presented. No proprietary information was identified by the licensee.

- Additional comments regarding Section E7.1, Engineering Performance In Restart Activities

  Regarding the inspectors' comments that at the end of the system walkdowns, they would assess the need to re-perform the system walk downs first performed, the head of the SERB, Mr. Don Hafer, stated some engineers had already been sent back out into the field as a result of lessons learned. When requested to give examples, Mr. Hafer stated that some systems had been walked down by individual operators, maintenance personnel, and engineers instead of the required teams. Those systems had been walked down again using teams. Mr. Hafer also stated that in at least one example, one system was walked down again due to the low number of findings.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

#M. Ackerman, Licensing Manager
#K. Baker, Manager, Production Engineering
#P. Barrett, Manager of Protection Assurance
#A. Blind, Vice-President Engineering
#S. Brewer, Manager of Regulatory Affairs
#D. Cooper, Plant Manager
#S. Delong, Management Information
#MB. Depuydt, Nuclear Licensing
#R. Gillespie, Operations Superintendent
#MB. Greendonner, Plant Protection
#D. Hafer, Manager, Plant Engineering
#D. Morey, Corrective Action Supervisor
#D. Noble, Radiation Protection Superintendent
#F. Pisarsky, Supervisor, Mechanical Component Engineering
#T. Postlewait, Manager, Design Engineering
#J. Sampson, Site Vice-President
#P. Schoepf, Supervisor, Safety-Related Mechanical Systems
#M. Stark, Engineering Supervisor
#J. Wiebe, Performance Assurance Manager

USNRC

#B. Burgess, Branch Chief, Region III

#Denotes those present at the April 27, 1998, exit meeting.

INSPECTION PROCEDURES USED

IP 37551	On-site Engineering
IP 61726	Surveillance Observations
IP 62707	Maintenance Observation
IP 71707	Plant Operations
IP 71750	Plant Support Activities
IP 92700	Onsite Review of LERs

ITEMS OPENED, CLOSED, AND UPDATED

ITEMS OPENED

50-315/98008-01	VIO	Failure to install jam nuts on 1 CD D/G exhaust manifold bracket as required by modification drawing
50-315/98008-02	VIO	Failure to determine adequate root cause for missing jam nuts on 1 CD D/G
50-316/98008-03	VIO	Failure to follow procedure when utilizing a continuous use procedure to operate in Mode 5

ITEMS CLOSED

50-315/94014-02 50-316/94014-02	IFI	Ability to maintain negative pressure in the auxiliary building
50-315/95010-00	LER	Inadequate communication results in unexpected ESF actuation
50-316/95013-02	VIO	Missed surveillance due to use of wrong Regulatory Guide
50-315/96002-06 50-316/96002-06	IFI	Licensee needs to update final safety analysis report
50-315/96004-06	IFI	Dual train ESW and CCW outages
50-315/96006-13 50-316/96006-13	IFI	Weak work practices observed during new fuel receipt
50-315/96009-03 50-316/96009-03	VIO	Inadequate maintenance rule reliability monitoring criteria
50-316/97018-05	IFI	Unit 2 AB diesel generator poor material condition
50-315/97018-06 50-316/97018-06	URI	Diesel generator exhaust manifold brackets

ITEMS UPDATED

50-315/98016-00	LER	Non-safety-related cables routed to safety related equipment
50-315/98017-00	LER	Debris recovered from ice condenser potentially represents unanalyzed condition

LIST OF ACRONYMS

ABPB	Auxiliary Building Pressure Boundary
AEP	American Electric Power
BOP	Balance of plant
bcc	blind carbon copy
BIT	Boron Injection Tank
cc	carbon copy
CCW	Component Cooling Water
CFR	Code of Federal Regulations
CHP	Construction Head Procedure
CR	Condition Report
CRID	Control Room Instrument Distribution
DCC	Donald C. Cook
D/G	Emergency Diesel Generator
DRP	Division of Reactor Projects
DPR	Demonstration Power Reactor
EDT	Eastern Daylight Time
ESF	Engineered Safety Feature
ESW	Essential Service Water
HELB	High Energy Line Break
IR	Inspection Report
JO	Job Order
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
LTOP	Low Temperature Overpressure Protection
MI	Michigan
MM	Minor Modification
NCV	Non-Cited Violation
NESW	Non-Essential Service Water
NOV	Notice of Violation
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
OHI	Operations Head Instruction
PMI	Plant Manager’s Instruction
PMP	Plant Manager’s Procedure
PDR	Public Document Room
QC	Quality Control
RG	Regulatory Guide
ROC	Restart Oversight Committee
RPS	Reactor Protection System
SERB	System Engineering Review Board
SMRT	Senior Management Review Team
SRO	Senior Reactor Operator
SSPS	Solid State Protection System
STP	Surveillance Test Procedure
S/G	Steam Generator
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item